Superfund Program
Proposed Plan

U.S. Environmental Protection Agency
Region 2

Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

662060

July 2012

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the Preferred Alternative to address the contaminated groundwater at the Cornell-Dubilier Electronics (CDE) Superfund site. In addition, this Plan includes summaries of cleanup alternatives evaluated for use at the site. This Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), the lead agency for the site, in consultation with the New Jersey Department of Environmental Protection (NJDEP), the support agency. EPA, in consultation with NJDEP, will select a final remedy for contaminated groundwater at the site after reviewing and considering all information submitted during the 30-day public comment period. EPA, in consultation with NJDEP, may modify the Preferred Alternative or select another response action presented in this Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

EPA evaluated potential remedies for groundwater and concluded that the characteristics of the site make aquifer restoration technically impracticable. EPA is proposing a remedial strategy that prevents exposure to site groundwater as the Preferred Alternative, discussed below. The Preferred Alternative relies primarily on institutional controls and long-term groundwater monitoring to prevent use of untreated groundwater as a source of potable (drinking) water.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund). This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation (RI) and Feasibility Study (FS) reports and other documents contained in the Administrative Record file for this site.

MARK YOUR CALENDARS

Public Comment Period
July 20, 2012 to August 20, 2012
EPA will accept written comments on the Proposed Plan during the public comment period.

Public Meeting
August 7, 2012 at 7:00 P.M.
EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at the South Plainfield Senior Center located at 90 Maple Avenue, South Plainfield, New Jersey.

For more information, see the Administrative Record at the following locations:

EPA Records Center, Region 2
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday – 9 A.M. to 5 P.M.

South Plainfield Public Library
2484 Plainfield Avenue
South Plainfield, New Jersey 07080
(908) 754-7885
Please refer to website for hours:
http://www.southplainfield.lib.nj.us/

SITE DESCRIPTION

The CDE site, located on Hamilton Boulevard in South Plainfield Borough, Middlesex County, New Jersey, consists of contamination from a former industrial facility that once operated at that location. The 26-acre vacant lot was occupied by the Cornell-Dubilier Electronics Company from 1936 to approximately 1962. Figure 1 shows the location of the former facility, which is Operable Unit 2 (OU2) of the site.

Operable Unit 1 (OU1, discussed in more detail below) includes a number of residential and commercial properties near the former facility that were contaminated by site activities.

Figure 2 also shows the extent of Operable Unit 3 (OU3), the subject of this Proposed Plan. The total land area of OU3 encompasses approximately 825 acres, which consists of the observed extent of site-related volatile organic compounds (VOCs) found in groundwater. Polychlorinated biphenyls (PCBs) have also been detected in groundwater, but only in the area of the former CDE facility. Figure 2 also shows a portion of the Bound Brook study area, Operable Unit 4 (OU4) of the site. Figures depicting the scope of the Bound Brook study area can be found in the Administrative Record for the site.

SITE HISTORY

The original facility, a complex that eventually grew to 18 buildings, was built in the early 1900s by Spicer Manufacturing, later known as Dana Corporation, a manufacturer of automobile components. Dana moved its operations to the Midwest in the 1920s and first leased, then sold the facility to CDE. During CDE's occupancy of the site, the company manufactured electronic components including, in particular, capacitors. PCBs and the degreasing solvent trichloroethylene (TCE) were used in the manufacturing process, and the company disposed of PCB- and TCE-contaminated material directly on the facility soils. CDE's activities led to widespread chemical contamination at the facility, as well as migration of contaminants to areas adjacent to the facility. TCE and PCBs have been detected in the groundwater and soils, and the now-demolished on-site buildings were contaminated with PCBs. In addition, PCBs have been found on adjacent residential, commercial, and municipal properties, and in the surface water and sediments of the Bound Brook.

With CDE's departure in 1962 until its closure in 2007, the facility was operated as a rental property, the Hamilton Industrial Park, with over 100 commercial and industrial companies occupying the facility as tenants.

NJDEP performed a site inspection in 1996, collecting a number of environmental samples that were found to contain PCBs. In June 1996, at the request of NJDEP, EPA collected soil, surface water and sediments at the facility, revealing elevated levels of PCBs, VOCs, and metals. In March 1997, EPA ordered the owner of the property, D.S.C. of Newark Enterprises, Inc. (DSC), a potentially responsible party (PRP), to perform a removal action. The removal action included paving driveways and parking areas in the industrial park, installing a security fence, and implementing drainage controls to mitigate risks associated with contaminated soil and surface water runoff from the facility. This work was substantially completed by the fall of 1997.

In 1997, EPA conducted a preliminary investigation of the Bound Brook to evaluate potential contamination from the site. Elevated levels of PCBs were found in fish and sediments of the Bound Brook, leading to an NJDEP-issued fish consumption advisory for the Bound Brook and its tributaries, including nearby New Market Pond and Spring Lake. These advisories remain in effect today.

Also in 1997, EPA tested residential and commercial properties in the blocks nearest the CDE facility. For several of the properties tested, PCBs were found in soil and interior dust that posed a potential health concern for residents of those properties. These investigations led to removal actions at 15 residential properties, conducted from 1998 to 2000.

In July 1998, EPA included the CDE site on the National Priorities List.

OU1 Remedy and Remedial Action

In 2000, as part of the first RI/FS for the site, EPA expanded the off-site investigations by collecting soil and interior dust samples from properties further from the CDE facility. EPA tested individual properties and performed a right-of-way survey that expanded the area tested from the nearest blocks (Hamilton Boulevard, Spicer and Delmore Avenues) in the initial removal action to approximately seven blocks from the facility during the RI. Because PCBs were found in Bound Brook, EPA also expanded the testing to residential areas that bordered the Brook.

The RI sampling found only sporadic detections of PCBs – 807 samples were collected during the RI, with only 25 detections over 1 milligram per kilogram (1 mg/Kg) total PCBs. PCBs were only at shallow depths (generally in the first two feet of soil) suggesting that the PCBs on the nearest properties (addressed by the removal actions) had come from wind-blown dust from the facility. The RI/FS did identify three additional properties with elevated levels of PCBs in soil, and the investigation revealed some areas worthy of further testing.

In September 2003, EPA selected a remedy to address PCB-contaminated soil and interior dust at properties in the vicinity of the former CDE facility, with concurrence from NJDEP. The remedy requires the excavation, off-site transportation and disposal of PCB-contaminated soil, and property restoration. The remedy also calls for interior dust cleaning at properties where PCBs are found indoors.

Using Federal and State funds, EPA began remediating the first OU1 properties in 2005. The Record of Decision (ROD) identified three properties; however, testing identified PCBs on an adjoining lot, and the action was expanded to address that property as well. Approximately 2,300 cubic yards of contaminated soil were excavated from the four properties.

Beginning in 2008, EPA began testing the additional areas identified in the OU1 ROD as needing further testing. This testing has sampled over 60 properties to date, and is nearly complete. Thus far, eight additional properties have been identified, bringing the total to be addressed by the OU1 remedy to 12, as of this date. The cleanup of these additional properties will begin in August 2012 and will take approximately four months to complete. Investigations are still being performed on several additional properties as part of OU1. EPA expects to complete the OU1 property investigations in 2012.

OU2 Remedy and Remedial Action

EPA began the RI/FS for the 26-acre facility in 2001. This investigation included soil and building testing and the installation of groundwater monitoring wells to assess the extent of the groundwater contamination at the site. While a variety of other contaminants of concern were identified, such as lead and arsenic, the primary contaminants of concern (in terms of risk posed and extent) were PCBs and TCE.

PCB-contaminated dust and building materials were found at unacceptable levels in the on-site buildings. Most of the buildings were occupied while EPA was conducting the RI/FS, and EPA advised the property owner and on-site tenants how to minimize the potential for exposure until a remedy could be selected and implemented.

Soil testing was performed in the overburden soils to bedrock, which was encountered as deep as about 15 feet below ground surface (15 feet bgs) in the rear of the facility. Extensive fill areas containing thousands of discarded capacitors were found in the rear, undeveloped portion of the facility property.

In evaluating remedies for the site, EPA identified the Principal Threats posed by the site to be soils and debris contaminated with PCBs in excess of 500 mg/Kg, or TCE in excess of 1 mg/Kg. EPA has developed guidelines for when to identify PCBs as Principal Threats, and TCE was targeted as a potential mobile source of groundwater contamination. The OU2 RI/FS estimated that as much as 115,000 cubic yards of soil and debris exceeded these thresholds. Nearly all of the site soils tested exceeded 10 mg/Kg total PCBs, an EPA cleanup guideline for commercial or industrial reuse.

The OU2 RI/FS also identified extensive groundwater contamination, from both TCE and PCBs, with TCE extending off the former CDE facility property. EPA elected to complete the groundwater investigations as a separate study (this OU3), and address the buildings, soil and debris on the former CDE facility property as a single operable unit (OU2).

On September 30, 2004, EPA issued a ROD for OU2, with concurrence from NJDEP. The remedy included four key components:

- Relocation of the tenants at the Hamilton Industrial Park, demolition of the buildings and removal of the PCB-contaminated building debris for off-site disposal;
- Excavation, for off-site transportation and disposal, of the Capacitor Disposal Area (CDA), an area of debris located in the rear of the facility;
- Excavation of the Principal Threats posed by the site for on-site treatment using low- temperature thermal desorption (LTTD), or off-site disposal for material not amenable to LTTD treatment; and
- Capping of the residual soil contamination to prevent direct contact or off-site migration of contaminants left on site.

Using Federal and State funds, EPA began relocation of the tenants in 2006, and completed the last relocation in the spring of 2007. The OU2 remedy has been performed in phases. The building demolition phase was performed first, allowing access to underlying contaminated soil that needed to be excavated. This work was completed in 2008. The CDA was addressed next, resulting in the removal of approximately 13,700 cubic yards of contaminated debris. The completion of the CDA excavation was followed by a third, and final, phase of the OU2 remedy, LTTD treatment and capping. The OU2 remedial design identified approximately

69,000 cubic yards of soil requiring treatment using LTTD. A mobile LTTD treatment unit was erected on site and, after a startup period when the unit's air emissions control systems were tested to make sure they met performance criteria set by NJDEP, the unit began treating PCB-contaminated soil in November 2009, completing work in February 2011. The LTTD unit treated approximately 65,000 cubic yards of site soils, needing to meet a minimum target of 10 mg/Kg total-PCBs in the treated soils. The unit actually treated the soils to less than 1 mg/Kg. The LTTD unit could not fully treat large debris and most of the capacitors found mixed in with the soil. Approximately 31,000 cubic yards of over-size debris and capacitors were screened out and sent off site for disposal as part of this phase of the cleanup.

The LTTD unit was fully decontaminated and removed from the site in July 2011. The remedy calls for a multilayer cap (e.g., soil and asphalt), and a surface water collection system. The surface water collection system, which is now in place, is installed above the cap so that surface water is collected and removed from the site without encountering residual soil contamination.

OU3 and OU4 Remedial Investigations

The comprehensive OU3 (groundwater) and OU4 (Bound Brook) RIs initially were performed concurrently. The OU3 field studies were completed in 2011, leading to this Proposed Plan. EPA expects to complete the OU4 field work, which includes the testing of over nine miles of the Bound Brook and its tributaries, connected floodplains, and extending into Green Brook, later this year. After completion of the sampling program, EPA will prepare a RI Report and perform human health and ecological risk assessments for OU4, followed by a FS study to evaluate potential remedies. These activities are planned for 2012 and 2013.

SITE CHARACTERISTICS

The discussion below summarizes a few essential features of the highly complex geologic setting found at the site. A better understanding of the site conditions can be found in the RI/FS Reports. To understand the site groundwater, EPA installed 22 monitoring wells, primarily in the Passaic Formation bedrock that is the predominant geologic unit within the study area. Wells were drilled as deep as 600 feet bgs. In addition to sampling groundwater for hazardous substances, EPA performed a series of pumping studies and other standard aquifer tests to understand how fractures in the bedrock aquifer are connected, with the goal of understanding how the groundwater moves. The RI also included rock coring and other sampling techniques to analyze the extent to which contaminants had been adsorbed into the rock itself, a phenomenon called matrix diffusion that is associated with certain rock formations, including the Passaic Formation.

Geology and Hydrogeology

The study area shown on Figure 2 is relatively flat, with surface water (Bound Brook, Cedar Brook and Spring Lake) as primary topographic features. The shallowest subsurface deposits are unconsolidated (loose material - not solid rock), consisting primarily of red-brown silt, sand and clay layers intermixed with urban fill. These deposits are no thicker than 15 feet at the CDE facility but are found as thick as 30 feet in the study area.

Below the overburden is the Passaic Formation, part of an ancient basin of Triassic-Jurassic sedimentary and igneous rocks found across the region. Tests during the RI indicate sedimentary rock (mudstone, siltstone and shale) typical of the Upper Passaic Formation, with numerous fracture zones present in bedrock from its surface to approximately 600 feet bgs, the maximum drilled depth.

The Passaic Formation generally forms a highly interconnected multi-aquifer system that is several hundred feet thick. Groundwater movement is primarily through horizontal and vertical fractures. In some areas, surface water (precipitation or local surface water features) either recharges, or is recharged by, the bedrock groundwater.

Groundwater in fractured sedimentary rock occurs in the pore spaces or "matrix" of the rock and in fractures of the rock; the capacity of a rock to store water is referred to as its "porosity." In the case of sedimentary rock, the porosity of the rock matrix is relatively high (commonly 5 to 20 percent of the rock's volume), because a large volume of water can be stored in the pore spaces of the bedrock. Conversely, the porosity of the rock fractures is relatively low, typically between 0.1 and 0.001 percent of the rock's volume, because a much smaller amount of water can be stored in the fractures. The average fracture aperture size found at the site is 83 microns, or slightly smaller than the thickness of a human hair. The differences in porosity only refer to the total amount of water stored in the rock matrix (pore spaces) and fractures.

Porosity does not correlate to movement of water through the rock matrix or fractures. The "permeability" of a rock formation refers to the degree of interconnectedness of the pore spaces and fractures in a rock, which in turn affects the degree to which groundwater can move through the rock. For the Passaic Formation, the interconnectivity of the pore spaces of the rock matrix is very low, so while a large volume of water is stored in the pore spaces, the permeability of the rock matrix is very low. By contrast, the degree of interconnectedness of the fracture network is high, and this fracture network is considered highly permeable.

Overall, the bedrock matrix has a high porosity (ability to store water) but a low permeability (ability to transmit the stored water). Conversely, the bedrock fractures have a low porosity (ability to store water) but a high permeability (ability to transmit water). This is a general description of most of the encountered bedrock. The shallowest bedrock units are more heavily fractured and weathered, so fractures in the first few feet of the bedrock tend to be larger, with a higher capacity to store water. Also, one pronounced large fracture zone was encountered deeper in the bedrock, at approximately 65 feet bgs at the CDE site, and again at close to 300 feet bgs near Spring Lake (geologic features are often tilted like this so that the same unit encountered at one depth in one location will appear at another depth at a different location). This intensively fractured seam is characterized by significantly larger-than-average fracture apertures, but it is the exception.

Keeping in mind that the portion of the aquifer studied at the site is hydrogeologically interconnected, for ease of discussion, the aquifer is described as three layers: shallow, intermediate, and deep water bearing zones as depicted in Figures 3, 4 and 5. The potentiometric surfaces depicted on these figures indicate the direction of groundwater flow at each of these depths. The shallow water bearing zone extends from ground surface to a depth of approximately 120 feet bgs and is hydraulically connected to Bound Brook, Cedar Brook and Spring Lake. This surface water influence disappears with depth. Groundwater movement in both the intermediate and deep water bearing zones is primarily to the northwest at the former CDE facility and arcs to the north and northeast with increased proximity to the Park Avenue Wellfield (discussed below).

Municipal Pumping History

Units of the Passaic Formation are used as a source of potable water for communities in the study area (Figure 6). Numerous wells tap the formation, with reported pumping rates ranging up to several hundred gallons per minute. Current groundwater pumping influences regional and local groundwater flow direction, and historical pumping of municipal extraction wells has exerted a dominant influence on groundwater movement at the former CDE facility.

All the currently-operating municipal wells in the area are owned and operated by Middlesex Water Company (MWC). MWC has been instrumental in enabling EPA and its consultants to reconstruct a pumping history, by researching its archives and producing records that extend back to the 1950s. The most influential wellfields (shown on Figure 6) affecting site groundwater are (currently) the Park Avenue Wellfield and (formerly) the Spring Lake Wellfield.

Today, Park Avenue pumps at a rate of several million gallons per day, making it the dominant pumping center in the area. The Spring Lake Wellfield is not currently used. It is made up of wells that surround Spring Lake, and began operation in the 1960s. Use of the system decreased in the 1990s, and the last of the wells stopped pumping in 2003. MWC's decision to curtail and then discontinue use of the Spring Lake Wellfield was partly a result of high VOC levels in the wells. (Water from the wellfields is combined at a central distribution center so that it can be treated prior to customer use. Spring Lake also had a second, local treatment system.) While MWC's treatment works could easily remove TCE and other VOCs, MWC elected to use other parts of its pumping network instead. Though dormant, the Spring Lake Wellfield infrastructure is still maintained by MWC and could be used at some time in the future.

When operating, the Spring Lake Wellfield influenced the direction of groundwater movement at the site. A comparison of historical aquifer data measured in 2000 to recent data show a marked change in groundwater elevations and the direction of groundwater movement. The groundwater elevations measured in 2000 were approximately five feet lower than those observed in the recent data. Past groundwater elevations indicated that groundwater movement in the shallow water bearing zone was generally drawn to the northwest by Spring Lake pumping, with surface water from Bound Brook discharging to the groundwater. Current conditions are just the opposite - today, shallow groundwater is likely discharging to Bound Brook.

Since the cessation of pumping at Spring Lake, hydrogeologic conditions at the former CDE facility are influenced by the on-going groundwater withdrawals at the more distant Park Avenue Wellfield.

NATURE AND EXTENT OF CONTAMINATION

Soils from OU2 and DNAPLs

The primary contaminants of concern identified in site soils were TCE and PCBs. (The RI documents the full extent of contaminants detected at the site.) These chemicals were released at the site in large quantities, as evidenced by the extent of the OU2 remedy, which required the excavation and treatment of Principal Threat wastes down to the top of the bedrock surface (approximately 15 feet bgs).

There is strong evidence that TCE and PCBs were released as dense non-aqueous phase liquids (DNAPLs). DNAPLs are among the most persistent contaminants in groundwater. When released into the environment, a DNAPL will flow downward through unsaturated soils and, after encountering groundwater, will also flow downward through saturated porous media, because DNAPLs are denser than water. DNAPLs generally have low water solubility, which, along with other factors, affects the flow properties of the fluid and can lead to pooling. Upon reaching the top of fractured sedimentary rock, the DNAPL will pool in areas of low permeability, eventually migrating downward through more transmissive fracture zones. DNAPL typically penetrates the fracture network, working into ever smaller openings, creating pools, fingers and disconnected droplets of residual contamination.

While site contaminants were released as DNAPLs, there is little evidence of DNAPL remaining at the site. The only detections were near monitoring wells MW-14S and 14D. Depending upon the water solubility of a given chemical, DNAPLs can begin to dissolve into groundwater and move with the groundwater. PCBs cannot, to any significant degree, be spread in a dissolved phase. Thus, while the extent of VOC contamination is wide-spread, the extent of PCBs in groundwater is limited to a few wells nearest the locations of the original PCB releases. Most of the focus of OU3 has been on several VOCs, particularly TCE that can dissolve in water and be carried far from the original release.

The absence of DNAPL is only partly explained by solubility. Over time, most of the DNAPL has been adsorbed into the rock itself, through matrix diffusion.

Rock Matrix Diffusion

Please refer to the text box for a description of the rock matrix diffusion phenomenon. As part of the RI, 465 split rock core samples were collected to assess the extent of rock matrix diffusion at the CDE site. Samples were collected at the highest on-site source areas (Monitoring Well MW-14S and 14D), just off site (MW-16), and near Spring Lake (MW-20).

TCE was the most common VOC present in the rock matrix samples (345 detections among 465 samples), followed by cis-1,2-dichloroethylene (cDCE; 96 detections), and tetrachloroethylene (PCE; 27 detections). The chemical cDCE is a breakdown product of TCE, and PCE is another common industrial solvent, though not one associated with the CDE site. At the MW-14 location, the distribution of the results between 23 and 67 feet bgs indicates that contaminant mass has completely penetrated the matrix blocks between fractures, indicative of very high historic aqueous concentrations, a dense fracture network, and

WHAT IS ROCK MATRIX DIFFUSION?

A highly interconnected fracture network such as the Passaic Formation provides a relatively large surface area for VOCs to sorb onto and then diffuse, or move, into the pore spaces in the rock itself- a process known as matrix diffusion. The pore volume of the rock matrix at the site is nearly two orders of magnitude larger than the fracture network, allowing it to hold the majority of the contaminant mass. Once the VOCs diffuse into the rock, they are left nearly immobile because of the low hydraulic conductivity of the rock matrix.

In the early stages after a release, diffusion into the matrix can slow the advance of the dissolved plume through the fractures. At first, the diffused mass penetrates only a short distance into the bedrock, but in cases with very large initial DNAPL releases (as at the CDE site), matrix diffusion can drive high VOC concentrations until it fully penetrates the matrix block. This effect more commonly occurs in source areas, where aqueous mass concentrations are highest and the residence time is the longest.

After a significant period of time (e.g., 50 years) in the fractured bedrock environment, contaminant mass that has moved into the rock matrix, will be higher in concentration than the groundwater within the fractures. At this point, the process of matrix diffusion will reverse, (this is known as back diffusion), slowly releasing the mass in the rock matrix pore water back to the fractures. Back diffusion occurs slowly over a very long period of time (usually in multi-century timeframe). So while contaminant movement through a bedrock aquifer can be retarded or slowed down by diffusion into the rock matrix, this same process is a major limiting factor in effective remediation due to the slow back diffusion process.

sufficient time to completely diffuse into the matrix. The pore water concentration of TCE in the rock matrix ranged from non-detect to 120,000 micrograms per liter (µg/L) at 33.1 feet bgs. The concentration of cDCE in the rock matrix ranged from non-detect to 330,000 µg/L at 33.1 feet bgs. PCE in the rock matrix ranged from non-detect to 130 µg/L at 75.95 feet bgs.

The results at MW-16 and MW-20 indicate that VOC mass was detected throughout the entire cored interval at each location (to a depth of 250 feet bgs for MW-16 and 412 feet bgs for MW-20). The largest proportion of VOC mass was detected in the 50 to 150 feet bgs depth interval for MW-16, and from approximately 220 to 350 feet bgs for MW-20, with the contaminant mass fully penetrating the matrix blocks between fractures in these intervals. In shallower and deeper sections of these borings, matrix diffusion was less pronounced, but still present. Pore water concentrations were substantially higher in MW-16 than in MW-20. For example, the maximum detected matrix block TCE concentration in MW-16 was 7,800 µg/L at 46.7 feet bgs, and 1,100 µg/L at 295.6 feet bgs in MW-20.

Groundwater

- **Shallow Groundwater (To 120 feet bgs):** The highest VOC concentrations were detected in the bedrock beneath the overburden source area at MW-14S/D, near the center of the former CDE facility, at depths between 23 and 75 feet bgs, with concentrations falling off sharply at depths greater than 75 feet bgs. Figure 3 shows the areal distribution of TCE in the shallow groundwater (TCE, as the most wide-spread site contaminant, is the best representation of the maximum extent of site constituents). The resultant VOC mass in the shallow bedrock has moved to the northwest, consistent with both the observed shallow groundwater gradient, and the historic gradient. Contamination in the shallow water bearing zone is generally limited to the area south of Bound Brook, as the surface water body currently acts as a boundary to shallow groundwater movement; however, elevated concentrations of VOCs in the shallow water bearing zone were detected north of Bound Brook in ERT-4, MW-20, and MW-21. The elevated results at these locations suggest vertical mass transport along steeply dipping fractures, and possibly the influence of historic pumping from the now inactive Spring Lake Wellfield.

- **Intermediate Groundwater (120 to160 feet bgs):** Figure 4 shows the areal distribution of TCE in the intermediate groundwater. The groundwater data show a more northwesterly distribution of contaminants near the former CDE facility, with a northeastward arching path of travel towards the capture zone of the currently operating Park Avenue Wellfield to the north.

- **Deep Groundwater (deeper than 160 feet bgs):** Figure 5 shows the areal distribution of TCE in the deep groundwater. As with the distribution of aqueous mass described in the intermediate water bearing zone, the groundwater data show a more northwesterly distribution of contaminants near the former CDE facility, with a northeastward arching path of travel towards the capture zone of the currently operating Park Avenue Wellfield.

Figure 7 shows a cross-section of VOC concentrations, indicating the downward direction of contaminant migration, generally aligned with the drawdown from municipal pumping wells.

As previously mentioned, a highly transmissive fracture zone intersected several boreholes during the investigation. This fracture zone probably facilitated the down-gradient transport of aqueous mass along a preferential pathway.

The aqueous mass movement has also been influenced by ongoing municipal well withdrawals. Although the general direction of groundwater movement beneath the former CDE facility is to the northwest, the pumping centers to the north and east of the former CDE facility have redirected the groundwater movement and contaminant mass transport. Today, groundwater extraction at the Park Avenue Wellfield is the dominant hydraulic influence on the local hydrogeology.

The influence of the various pumping centers in the area created a highly variable flow direction over time within the fractured rock aquifer. While the direction of groundwater movement may have shifted locally under variable pumping regimes, the general regional gradient was most influenced by the historically most productive wellfield in the area (Park Avenue). In addition, periods of heavy groundwater usage or more localized water extraction (such as at the Spring Lake wells that operated between 1964 and 2003) would have lowered regional groundwater levels, reversing the head relationships between groundwater and surface water.

Other Potential Sources and Effects on Municipal Water Influent
While the site is a significant source of VOCs to groundwater in this area, NJDEP has identified other sources of similar contaminants within or near the study area. EPA's furthest well from the site, MW-23, is approximately 4,000 feet down-gradient of the facility and still contains elevated levels of site-related constituents (e.g., 70 µg/L TCE was detected at approximately 450 feet bgs). Additional monitoring locations are needed beyond this well; however, additional wells to the northeast, the direction of groundwater flow, will be strongly influenced by the local wellfields. While VOCs detected in monitoring wells close to these pumping centers might originate from the CDE site, it is equally likely that they originate from multiple sources.

The influent water entering the MWC treatment works generally has TCE levels in the range of non-detectable to 2 µg/L (the New Jersey drinking water criteria is 1 µg/L). Levels in the treated water are non-detectable. Given the large capture zone of MWC's multiple wellfields, it cannot be determined whether and to what extent contamination from the CDE site is contributing to detectable levels of TCE in the influent water.

Private Well Investigations
Numerous private, industrial, and municipal wells tap the Passaic Formation near the site study area and, as part of the RI, EPA searched for wells in the area that may be in use. Through NJDEP's well registry database and other resources, to date, EPA has identified 40 potential wells within a one-mile radius of the site (31 residential wells and nine wells designated for industrial/municipal - non-drinking - purposes), and has visited each identifiable location. Most of the locations from NJDEP's registry were older private wells (e.g., installed before the 1960s) and EPA was able to determine that the wells no longer existed. EPA identified one private drinking water well, belonging to a home up gradient of the site. Though not within the area of site groundwater contamination, EPA still sampled this well, and found no detectable contamination. EPA also identified four wells used by the Borough and the South Plainfield School District for a variety of purposes, from irrigation to filling the municipal swimming pool. EPA sampled these wells, detecting levels in excess of drinking water standards for TCE. Because these wells were being used for purposes other than drinking water (such as irrigation) EPA evaluated the potential for exposures to users of the facilities where the water was used, and to workers that operated the wells and associated equipment. EPA did not identify unacceptable exposures from the use of these wells, as long as they are not used for drinking water. One of the uses, filling the municipal swimming pool, led EPA to test the pool water at the request of the Borough. The tests, collected just after the pool was filled, did not detect any residual TCE. These results were as expected: TCE, like other VOCs, poses a health threat through consumption (drinking water) or vapor exposure (collecting in an enclosed space like a basement), but quickly evaporates from surface water, alleviating the potential for exposure.

Bound Brook Sediments and Groundwater
The investigation of Bound Brook sediments is not yet complete and is not the subject of this Proposed Plan. Understanding potential threats from contaminated groundwater to surface water (OU4) is a component of the OU4 study. While the OU2 remedy is eliminating the potential for surface transport of contaminants to Bound Brook, the OU3 RI shows strong evidence that upwelling groundwater is discharging to Bound Brook, and shallow wells adjacent to the Brook suggest contaminant discharge to the Brook from groundwater.

TCE that might discharge to surface water would evaporate quickly, and the potential for exposure is minimal. Similarly, the relative insolubility of PCBs limits the potential that discharging groundwater would pose a route of off-site migration for PCBs. In July 2012, as part of the OU4 Bound Brook investigation, seep samplers are being deployed along the creek to measure groundwater discharging to surface water, from which the potential for human or ecological exposure can be determined. The seep sampling will clarify whether this is a plausible transport mechanism.

Vapor Intrusion
VOC vapors have the potential to volatilize from contaminated groundwater and collect inside closed spaces (e.g., basements), and this "vapor intrusion" poses potential health concerns. Vapor intrusion studies have been conducted during the RI at a number of properties. EPA targeted residential properties between the former CDE facility and Spring Lake, where shallow groundwater contamination posed a plausible concern for vapor intrusion occurring (areas with only deeper groundwater contamination are not at risk). EPA also targeted a number of properties in the core OU1 study area, just south of the former CDE facility, as a precaution. These studies indicate that vapor intrusion exposures are not a current pathway of concern at the site. EPA tested 25 properties, and all but two showed no evidence of vapors in the subsurface. Although elevated vapor levels were detected under the basement slab at two properties, one was in an area not affected by site groundwater

contamination, and at the other, only PCE was detected. A local source of PCE appears to be affecting this property, as the PCE does not originate from the site. In both cases, there was no evidence of vapors inside the structures.

SCOPE AND ROLE OF ACTION

EPA is addressing the cleanup of the site in four phases, called operable units. Operable Unit 1 (OU1) addresses residential, commercial and municipal properties with elevated PCB levels in surface soils or interior dust in the vicinity of the former CDE facility. OU2 addresses buildings and soil at the former CDE facility, and included relocation of tenants from the facility followed by demolition of the buildings, excavation and on-site treatment or off-site disposal of PCB-contaminated soil and debris, and capping of the 26-acre facility. The OU1 and OU2 remedies are currently being performed by EPA using Federal and State funding. This Proposed Plan is for Operable Unit 3 (OU3), groundwater, which will comprise the final action for the groundwater. Operable Unit 4 will address sediments and surface water in the Bound Brook and will be the final phase of the response action for the site.

OU2 addressed "principal threat wastes" in soils, including wastes that were considered ongoing source materials of groundwater contamination. EPA generally does not consider groundwater as principal threat waste, although NAPLs may be viewed as source materials. At this site, EPA has not designated the groundwater a principal threat waste.

In 2000, the Borough of South Plainfield began assessing potential future redevelopment plans for the Hamilton Industrial Park, and how that redevelopment might be accomplished as part of a remedy for the facility soils and buildings (OU2). In December 2001, the South Plainfield Borough Council designated the Hamilton Industrial Park and certain lands in the vicinity a "Redevelopment Area," and in July 2002, the Borough adopted a redevelopment plan. The Borough subsequently designated a developer for the site. With the OU2 cleanup nearing completion, EPA has been working with the developer to resolve the many engineering and legal issues associated with putting the former CDE facility property back into productive use.

ENFORCEMENT

EPA has identified a group of potentially responsible parties (PRPs) for the site. PRPs for the site include Cornell-Dubilier Electronics, Inc. (CDE), Dana Corporation, Dana Corporation Foundation, and Federal Pacific Electric Company (FPEC). In addition, DSC, the current owner of the site property, has been named as a PRP.
Early in the cleanup process five administrative orders were issued to various PRPs for the performance of portions of removal actions required at the site. These included the site stabilization order issued to DSC in 1997 described above. In 1998, 1999, and 2000, EPA entered into a series of administrative orders with PRPs to implement removal actions at fourteen properties with PCB-contaminated soil.

The PRPs declined to undertake the site RI/FS, and with each of the selected remedies (OU1 in 2003 and OU2 in 2004), the PRPs again declined to perform the remedies. The Dana Corporation declared bankruptcy in 2006, and EPA reached a bankruptcy settlement in 2008.

SUMMARY OF SITE RISKS

As part of the RI/FS, a baseline human health risk assessment was conducted to estimate current and future effects of contaminants on human health and the environment. A baseline human health risk assessment is an analysis of the potential adverse human health effects caused by hazardous-substance exposure in the absence of any actions to control or mitigate these exposures under current and future site uses.

A four-step human health risk assessment process was used for assessing Site-related cancer risks and noncancer health hazards. The four-step process is comprised of: Hazard Identification of Chemicals of Potential Concern, Exposure Assessment, Toxicity Assessment, and Risk Characterization (see adjoining box "What is Risk and How is it Calculated" for more details on the risk assessment process).

Chemicals of potential concern were selected by comparing the maximum detected concentration of each analyte in groundwater with available risk-based screening values for potentially complete pathways. TCE, cDCE and other VOCs, along with PCBs were determined to be chemicals of potential concern in site groundwater.

WHAT ARE THE "CONTAMINANTS OF CONCERN"?

EPA has identified VOCs (primarily TCE and its breakdown products, the most prominent of which is discussed below) and PCBs as contaminants in groundwater at the site that pose the greatest potential risk to human health.

Trichloroethylene (TCE): TCE has been historically used as a solvent and degreaser in many industries. TCE is considered a probable human carcinogen. The highest levels of aqueous-phase TCE (found in bedrock beneath the former CDE facility) exceed 150,000 μg/L. The concentration of aqueous-phase TCE off site exceeds 1,000 μg/L near Veteran's Memorial Park.

cis-1,2-Dichloroethylene (cDCE): cDCE is a known breakdown product of TCE. The highest levels of cDCE were detected at 39,000 μg/L in shallow on-site groundwater. Off-site groundwater was detected just over 100 ug/L in shallow groundwater north of Bound Brook.

Polychlorinated Biphenyls (PCBs): PCBs have been historically used as dielectric fluid in electrical capacitors. PCBs are considered probable human carcinogens. The highest levels of aqueous-phase PCBs (found in bedrock beneath the former CDE facility) exceed 200μg/L.

The exposure assessment identified potential human receptors based on a review of current and reasonably foreseeable future land use at the site. The CDE groundwater study area is primarily residential interspersed with commercial and public-use properties. Based on the NJDEP classification of groundwater within the site as Class IIA groundwater (i.e., includes potable usage), a future residential scenario for groundwater was evaluated as part of the risk assessment. Potentially exposed populations in current and future risk scenarios included: commercial/industrial workers, construction/utility workers and residents. Potential exposure routes evaluated for these receptors included ingestion and dermal contact with constituents in groundwater, as well as inhalation of constituents volatilizing to ambient or indoor air from groundwater. The toxicity assessment identified potential effects generally associated with exposure to the chemicals of potential concern. Two types of toxic effects were evaluated for each receptor in the risk assessment: carcinogenic effects and non-carcinogenic effects. Calculated risk estimates for each receptor were compared to EPA's acceptable range of carcinogenic risk of 1 x 10-6 (one-in-one million) to 1 x 10-4 (one-in-ten thousand) and calculated noncancer health hazard to a target value of 1. Quantitative assessment of receptors under the future potable groundwater use exposure scenarios indicated that contaminated water at the site

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other noncancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and noncancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one in ten thousand excess cancer risk;" or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one in ten thousand to a one in a million excess cancer risk. For noncancer health effects, a "hazard index" (HI) is calculated. The key concept for a noncancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which noncancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a noncancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at the site.

poses an unacceptable carcinogenic risk to human health due to the presence of TCE in groundwater above maximum contaminant levels (MCLs) for drinking water. Other VOCs and arsenic were also minor contributors to risk in groundwater. Unacceptable carcinogenic risk was calculated for the following exposure groups: Commercial/Industrial risk is 4×10^{-3}; Resident adult risk is 7×10^{-3}, resident child risk is 3×10^{-3}.

Quantitative assessment also indicates that groundwater contamination poses unacceptable noncancer health hazards due to PCBs and cDCE for all future use scenarios as well (construction worker, commercial/industrial worker, resident). PCBs were the main risk-driving contaminant in groundwater in the area around the former CDE facility. PCBs were not found away from the facility; cDCE was the primary noncancer risk-driver in off-site areas. Noncancer Hazard Indices ranged from 3 for the construction/utility worker exposure to shallow off-site groundwater to 700 for resident child exposure to the entire aquifer. Risk and hazard estimates for the remaining receptors were less than or fell within the acceptable risk range of EPA's target values.

It is EPA's current judgment that the Preferred Alternative identified in this Proposed Plan is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Ecological Risk Assessment

A plausible ecological exposure scenario may derive from groundwater discharge to the Bound Brook, and EPA is assessing ecological risks as part of OU4. The likelihood of a completed ecological exposure pathway for VOCs in surface water is remote given their volatility. Also, while EPA is assessing the potential for PCB transport to the creek via groundwater, EPA has already detected elevated PCBs in sediments of this section of the Bound Brook at concentrations several orders of magnitude higher than the most elevated groundwater concentrations, probably resulting from buried materials in or adjacent to the Bound Brook. Thus, EPA's assessment of the potential for PCBs to enter the Bound Brook is only evaluating the potential for recontamination after completion of a potential OU4 remedy. There are no other plausible ecological receptors for groundwater.

REMEDIAL ACTION OBJECTIVES

In developing Remedial Action Objectives (RAOs) for groundwater, EPA expects to return usable groundwater to its beneficial uses (in this case, use as drinking water) wherever practicable, within a timeframe that is reasonable given the characteristics of the site. EPA also acknowledges, however, that groundwater restoration is not always achievable due to limitations in remedial technologies and other site-specific factors.

After evaluating the nature and extent of groundwater contamination and the available remedial alternatives for groundwater, EPA has concluded that the available technologies cannot achieve restoration of the contaminated groundwater to drinking water standards. EPA is recommending a waiver of applicable or relevant and appropriate requirements (ARARs) due to technical impracticability (TI) for groundwater at the site. EPA documented its evaluation of the potential for groundwater restoration in a separate TI Evaluation Report, and identified a zone where ARARs are expected to be exceeded for the foreseeable future (For further details, please refer to Figure 7-1 from the TI Evaluation Report, in the Administrative Record).

When restoration of groundwater to beneficial uses is not practicable, EPA selects an alternative remedial strategy that is technically practicable, protective of human health and the environment, and satisfies statutory and regulatory requirements of CERCLA. Consistent with the National Contingency Plan (NCP), alternative remedial strategies for TI sites typically address three site issues: "exposure control;" "source control;" and "aqueous plume remediation." RAOs have been developed for each component of EPA's recommended alternative remedial strategy.

Remedial Action Objective for "Exposure Control"

The primary objective of any remedial strategy is overall protectiveness, in this case by mitigating exposure to contaminated groundwater for potential receptors:

- Prevent or minimize potential risks to human and ecological receptors from exposure by contact, ingestion, or inhalation/vapor intrusion of contaminants in groundwater attributable to the site.

Remedial Action Objectives for "Source Control"
For "source control," when restoration of groundwater to beneficial uses is not practicable and a TI waiver is necessary, EPA expects to address contaminant source areas to the extent practicable, particularly when addressing groundwater sources also supports further risk reduction for the site as a whole. By implementing a remedial action for the former CDE facility, which addresses VOCs and PCBs in the overburden soil, EPA has already addressed site sources to the extent practicable, and the OU2 remedy also supports further risk reduction at the site overall. Thus, the OU3 FS evaluated whether further "source control" actions could be taken in the bedrock aquifer.

For the bedrock groundwater, the extensive zone over which VOCs have adsorbed to and/or diffused into the bedrock matrix (approximately 825 acres) constitutes what is expected to be an ongoing source of contamination to the groundwater, via back diffusion to the groundwater in the fractures, for centuries.

As discussed in the TI Evaluation Report, there are no remedial prospects for achieving ARARs for the whole of the affected aquifer within a reasonable timeframe. The primary processes whereby the contaminants will naturally attenuate (dilution, dispersion and natural degradation) are occurring in portions of the aquifer, but at very slow rates, and there are no currently available technologies effective at remediating the majority of the mass within in the rock matrix pore water.

While restoration of the entire aquifer is not practicable, the OU3 FS evaluated whether treatment and/or containment of higher concentration areas in groundwater and in the rock matrix pore water might further satisfy EPA's expectation to address source areas. For example, the FS evaluated whether reducing the mass remaining in the ground might allow at least part of the aquifer to restore more quickly. The RAOs used to assess these "source control" alternatives are as follows:

- Mitigate, to the extent practicable, a "contaminant source area" as an ongoing source of groundwater contamination to areas beyond it;
- Demonstrate the potential (through predictive aquifer modeling) that mass reduction or containment of the targeted "contaminant source area" would provide long-term improvement to the groundwater in a reasonable time frame; and
- Support further risk reduction for the site as a whole.

To satisfy these RAOs, the FS evaluated two different "contaminant source areas" of different contaminant concentrations at the area of the original release, the former CDE facility: 1) a zone in which concentrations of total VOCs exceed 25,000 µg/L; and 2) a zone in which concentrations of total VOCs exceed 2,500 µg/L. The 25,000 µg/L contour encompasses most of the area where VOC mass has fully penetrated the rock matrix. The 2,500 µg/L total VOC area was selected as a second point of comparison, to allow for the evaluation of a remedy one order of magnitude larger in scope than the 25,000 µg/L total VOC area. (A more comprehensive discussion of the rationale for selecting these zones is included in the FS.)

Remedial Action Objective for "Aqueous Plume Remediation"
Wide-spread rock matrix diffusion is the primary site factor that renders plume restoration technically impracticable, with the VOCs in the rock matrix pore water acting as a continuing source to neighboring rock fractures for the foreseeable future. In such cases, EPA considers hydraulic containment of the leading edge of the aqueous plume, assuring that the plume size does not increase and, in combination with either active aquifer restoration (pumping wells) or natural processes (diffusion, dispersion and natural degradation), allowing portions of the aquifer outside the TI zone to recover and eventually meet ARARs.

Groundwater modeling conducted as part of the RI demonstrated that, given that the original DNAPL releases occurred at least 50 and as long as 80 years ago, the VOCs have, over that period of time, spread throughout the aquifer to the maximum extent possible, and the leading edge of the plume is not currently expanding. Groundwater flow direction is controlled by municipal well pumping. The rate and extent of pumping has varied over time, but within a relatively narrow range, generating a relatively stable flow field.

While the plume may not currently be expanding, the following RAO has been developed to satisfy EPA's expectations with respect to the prevention of further plume expansion and, to the extent practicable, restoration of the aqueous plume:

- Prevent further migration of site contaminants in groundwater at levels posing an unacceptable risk to human health beyond the areal extent of the proposed TI zone.

The remedial alternatives discussed below do not actively address this RAO because, as previously mentioned, groundwater modeling indicated that the VOCs have spread throughout the aquifer to the maximum extent possible, and the leading edge of the plume is not currently expanding.

Remediation Goals
The bedrock aquifer has been identified by New Jersey as Class IIA (a potential source of drinking water); therefore, applicable or relevant and appropriate requirements (ARARs) for groundwater include the NJDEP Groundwater Quality Criteria (NJAC 7:9-6), the Safe Drinking Water Act maximum contaminant levels (MCLs), and the New Jersey Secondary Drinking Water Standards (NJAC 7:10-7).

To meet the "exposure control" and "aqueous plume remediation" RAOs defined above, EPA has identified remediation goals to aid in defining the extent of contaminated groundwater. In general, remediation goals establish media-specific concentrations of site contaminants that will pose no unacceptable risk to human health and the environment. For each constituent, the lower of the EPA federal MCLs or NJDEP Groundwater Quality Criteria was selected as the remediation goal for groundwater, listed in Table 1. These remediation goals would be used for developing use restrictions and other actions to prevent exposure to, and for assessing the extent of (or expansion of) the aqueous plume, but not for achieving restoration of the groundwater.

These remediation goals are relevant to the "source control" RAOs defined above, though in a different way. It is possible that a treatment action (as opposed to containment) would achieve these remediation goals in at least a portion of the targeted "contaminant source areas." More important, however, the FS explored whether removing contaminant mass from one part of the aquifer might improve overall groundwater quality, possibly achieving the remediation goals for some down-gradient part of the contaminated aquifer in a reasonable timeframe.

Surface Water
Based upon water level measurements, groundwater may be discharging to Bound Brook near the site. The potential for groundwater constituents to migrate to surface water and sediments in the Bound Brook is being evaluated as part of the OU4 RI/FS. Groundwater RAOs related to a possible surface water discharge pathway cannot be fully evaluated until the OU4 RI field work and subsequent risk assessments are completed. Should a response action related to groundwater discharge to Bound Brook be needed, it will be considered in the OU4 FS.

SUMMARY OF REMEDIAL ALTERNATIVES

Common Elements
All the alternatives except "no action" include common components to address "exposure control." Because any combination of remedial alternatives will result in some contaminants remaining on the site above levels that would allow for unrestricted use, five-year reviews would be conducted. In addition, institutional controls such as a Classification Exception Area (CEA) would be required for the affected groundwater as one component of maintaining the long-term protectiveness of the implemented remedy.

Exposure Control
Municipal water is available to residents and businesses throughout the study area, so exposure to contaminated groundwater through direct contact or ingestion or inhalation would only occur as a result of direct exposure from an older, private well. (EPA's efforts to locate private wells are discussed elsewhere in this Proposed Plan.) Vapor intrusion is not currently a site pathway for contaminant migration or inhalation exposure. The primary RAO with respect to groundwater is to prevent unacceptable risks to receptors by preventing exposure to groundwater contaminants. This includes encouraging the use of existing municipal drinking water supplies that are already treated and frequently tested, and surveying older private wells that may still remain in the area, including wells that might be used privately for non-potable uses (e.g., lawn watering) to ensure that they do not provide a conduit to exposure.

All the alternatives, with the exception of the "no action" alternative, include groundwater monitoring. Monitoring would be performed primarily using wells that are already in place. The most-distant monitoring well installed, MW-23, still has elevated VOC levels; therefore, monitoring points further down gradient would be needed. However, note that MW-23 is well within the zone of influence of the Park Avenue Wellfield, and that there are other sources of the same VOCs within the aquifer. For wells further down gradient than MW-23, it will become difficult to distinguish VOCs that might be coming from the CDE plume or from some other nearby source.

All the alternatives, with the exception of the "no action" alternative, include periodic vapor intrusion testing. While EPA has already performed extensive vapor intrusion testing in areas potentially threatened (within the footprint of the shallow plume), under any active remedy, EPA would require additional testing, either soil gas probes or actual testing of residences, to assure that conditions have not changed and that there is not an exposure pathway through vapor intrusion.

Aqueous Plume Remediation

As discussed earlier, the RI concludes that the aqueous plume is not currently expanding, due to the age of the contaminant plume and the ongoing hydraulic draw of municipal pumping wells. As part of any active remedy, monitoring would be required to confirm that this conclusion is valid, and to identify changes that might occur in the future that might cause the plume to expand beyond its current limits. In addition to the groundwater monitoring discussed earlier, the remedy would monitor the rates of pumping of municipal wells in the area and assess the effects of changes in pumping. For example, closing a municipal wellfield or, alternatively, the startup of some new municipal pumping center outside the contaminant plume, has the potential to change the extent of the contaminant plume. In addition, the remedy would also monitor the influent concentrations at nearby municipal wells for changes in VOC levels, as additional evidence that the plume is, in fact, not expanding.

Should monitoring indicate that the plume is actually expanding, EPA would have limited options at its disposal, in the form of some kind of hydraulic containment. Given the current size of the CDE groundwater plume, the hydraulic containment required may need to be on a massive scale, pumping the aquifer in a way that would be akin to, and would compete with, local municipal pumping wells. For example, the site hydraulic containment alternatives discussed below would be designed for less than 50 gallons per minute (50 gpm) of pumping, or 72,000 gallons per day; in contrast, attaining hydraulic control of the plume could require pumping on the order of 1 to 2 million gallons per day.

Should such a response action be needed, EPA would consider restarting the currently inactive Spring Lake Wellfield, in collaboration with MWC, rather than building a new hydraulic containment system essentially at this same location. Groundwater modeling performed as part of the RI indicated that, when it was active, the Spring Lake wells did control the flow of groundwater from the site, and the zone of influence appears to have been large enough to assert hydraulic control to the current extent of the groundwater plume. This would need to be verified, and additional pumping might be needed. The Spring Lake Wellfield has its own treatment system (an air stripping tower) that may need modification before it could be restarted.

This scenario is described here to better define the purpose of the monitoring contemplated in this Proposed Plan. At this stage, EPA does not believe hydraulic containment of the plume is necessary. EPA would present additional findings to the public before undertaking such an action.

Further Source Control

The active components of Alternatives 3 and 4 focus on achieving the “source control” RAOs discussed above. Potential applicable technologies were identified and screened using effectiveness, implementability and cost as criteria, with emphasis on the effectiveness of the remedial action. Those technologies that passed the initial screening were then assembled into four remedial alternatives. In-situ VOC destruction technologies typically associated with the treatment of VOC plumes, such as in-situ chemical oxidation or enhanced biodegradation, did not survive this screening process, because they had no capacity to treat the VOCs trapped within the pore spaces of the rock matrix, the zone of the bedrock that is currently retaining the bulk of the contaminant mass. The FS concluded that aquifer heating, as discussed in Alternative 4, had the best chance of drawing VOCs out of the rock matrix within a reasonable timeframe.

The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, procure contracts for design and construction, or for subsequent operation and maintenance.

Alternative 1 - No Action

Capital Cost:	$0
Annual O&M Costs:	$0
Total Present Worth:	$0
Implementation Timeframe:	Not Applicable

Superfund regulations require that the "No Action" alternative be evaluated at every site to establish a baseline for comparison with other remedial alternatives. Under Alternative 1, no further remedial actions would be taken to address the groundwater. Alternative 1 does not include monitoring or institutional controls. Because no action results in contaminants remaining on site above acceptable levels with no controls, a review of the site at least every five years would be required.

Alternative 2 – Groundwater Monitoring, Institutional Controls

Capital Cost:	$1,529,000
Annual O&M Costs:	$190,700
Total Present Worth:	$5,721,000
Implementation Timeframe:	*1 Year*

Under this alternative, a long-term groundwater monitoring program would be instituted to collect data on contaminant concentrations and plume properties at the site. Groundwater samples would be collected, at least annually to start, and analyzed for VOCs, PCBs in representative wells, general water quality parameters, and natural attenuation parameters. Monitoring would also include coordinating with MWC and assessing changes in pumping or influent water quality to municipal systems. Institutional controls would include restricting the installation of new wells, identification and closure of any private potable wells in the plume area, with the intent to reduce potential future exposure to contaminants. Institutional controls would include a CEA, pursuant to NJDEP regulations. A review of site conditions would be conducted every five years that would include an evaluation of the extent of contamination and an assessment of contaminant migration and attenuation over time.

Monitoring under this remedial alternative would include periodic vapor intrusion testing, coupled with ongoing groundwater monitoring of the plume.

Alternative 3 – Hydraulic Containment of the "Contaminant Source Zone"

Alternative 3a Target:	*25,000 mg/l plume*
Capital Cost:	*$3,839,000*
Annual O&M Costs:	*$635,000*
Total Present Worth:	*$17,440,000*
Implementation Timeframe:	*1 Year*

Alternative 3b Target:	*2,500 mg/l plume*
Capital Cost:	*$5,271,000*
Annual O&M Costs:	*$808,000*
Total Present Worth:	*$21,019,000*
Implementation Timeframe:	*1 Year*

Alternative 3 involves controlling the discharge of contaminated groundwater from the "contaminant source zone" (either the 25,000 µg/L or 2,500 µg/L VOC area) to meet the "source control" RAOs. Alternative 3 also includes the monitoring and institutional controls discussed in Alternative 2.

For Alternative 3a, hydraulic control of groundwater could be accomplished by extracting contaminated groundwater at a rate of approximately 7 gpm using one vertical extraction well, approximately 50 feet deep, located in the center of the treatment area (near the current well MW-14). For Alternative 3b, hydraulic control of groundwater could be accomplished by extracting contaminated groundwater at a rate of approximately 24 gpm via three vertical extraction wells, each approximately 50 feet deep, and located approximately as shown on Figure 8. An on-site water treatment system would treat the extracted groundwater. The groundwater treatment system is assumed to include oil-water separation (to remove NAPL), chemical or ultraviolet oxidation to treat organics (VOCs, PCBs, etc.), metals removal, followed granular activated carbon (GAC) treatment as a polishing step prior to discharge to Bound Brook.

Hydraulic control through groundwater extraction removes very little contaminant mass – only that which is present in the bedrock fractures in the area of hydraulic influence. The cost evaluation of Alternative 3a or 3b assumes a duration of 30 years, a default value used for most Superfund remedies for cost comparison between different alternatives. However, the time frame for back diffusion of contaminant mass (primarily TCE and cDCE) residing in the rock matrix back to the fractures is on the order of decades and centuries. Therefore, it is expected that hydraulic control/capture (along with the attendant treatment works) for both Alternatives 3a and 3b would be required indefinitely, assuming that it would continue while concentrations of contaminants exceed the remediation goals.

This "source control" alternative was evaluated to assess whether, by eliminating the "contaminant source area" through hydraulic control at the site, areas down-gradient of the site would show sufficient improvement over time to satisfy the RAO to "provide long-term improvement to the groundwater in a reasonable time frame." This evaluation was primarily based upon groundwater modeling, which can be used to predict groundwater conditions projected out into the future, using site-specific data about current conditions. The groundwater model predicted groundwater conditions 50 years from now and 100 years from now, under current conditions and with the hydraulic controls of Alternative 3a or 3b. The modeling indicated that removing either the smaller or larger "contaminant source area" at the site would not change down-gradient groundwater conditions to any significant degree – no down-gradient areas would reach the remediation goals, or improve even marginally, with the hydraulic controls in place. The on-site source appears to have very little influence on down-gradient groundwater conditions over the long term, and "controlling the source" neither improves nor diminishes overall aquifer conditions to any significant degree.

Alternative 4 – Thermal Treatment of the "Contaminant Source Zone"

Alternative 4a Target:	*25,000 mg/l plume*
Capital Cost	*$27,340,000*
Annual O&M Costs:	*$190,700*
Total Present Worth:	*$33,061,000*
Implementation Timeframe:	*1 Year*

Alternative 4b Target:	*2,500 mg/l plume*
Capital Cost:	*$122,800,000*
Annual O&M Costs:	*$190,700*
Total Present Worth:	*$128,521,000*
Implementation Timeframe:	*3 Years*

Alternative 4 involves thermal treatment of the "contaminant source zone" (either the 25,000 µg/L or 2,500 µg/L VOC area) to meet the "source control" RAOs. Alternative 4 also includes the monitoring and institutional controls discussed in Alternative 2. The FS developed a conceptual design with a target temperature for the aquifer of 100°C (212°F). At this temperature, VOCs in the treated area would be vaporized and mobilized to a series of vapor and fluid collection points.

The conceptual thermal treatment design includes the following major components:

- Installation of heater wells, vertical soil vapor extraction (SVE) points and multiphase extraction (MPE) wells to treat to a depth of 50 feet. The heater wells would be installed at a 15-foot spacing, and the heater wells would generate very high temperatures (in excess of 500°C/932°F), heating the spaces between the wells to the target temperature.
- Installation of steam injection wells and MPE wells between 50 and approximately 65 feet bgs. The steam wells would be installed at a 30-foot spacing.
- If needed, a vapor cap would be installed to extend slightly beyond the boundaries of the treatment area, to capture fugitive vapors.
- Thermal oxidation is assumed for use as an above-ground vapor and fluid treatment technology, and liquid GAC is included for the liquid treatment.

By constantly drawing off the vapors, the entire treatment zone is kept under a vacuum to minimize transport of contaminants out of the treatment area. The use of steam at the bottom of the thermal treatment area creates a "hot floor" to provide a barrier to vertical migration of contaminants. At 100°C, dissolved phase and DNAPL VOCs would be vaporized and removed as a vapor or a mobilized liquid via the collection network (SVE and MPE wells).

Although a portion of the PCBs would likely also be removed, higher temperatures would be needed to obtain reliable removal of PCBs. Temperatures higher than 100°C are only attainable if the aquifer is dewatered, which is not feasible given the highly transmissive weathered rock zone at 65 feet bgs. The fate of dissolved and adsorbed contaminant mass located within the rock matrix is uncertain; however, it is assumed that at least a portion of the contaminant mass within the rock matrix would be volatilized out of the rock matrix and be captured by the SVE and MPE wells.

For Alternative 4a (approximately 2 acres), implementation of the remedy is estimated to take approximately 12 months, including time required to drill the various wells and heating points, the time required to bring the aquifer up to the target temperature, and time to demobilize. The active treatment of the aquifer would require approximately five months of that time period.

For Alternative 4b, which is approximately five times larger than Alternative 4a, it is assumed that the treatment area would be divided into five zones, each one encompassing approximately the same size as Alternative 4a, and that they would be treated in sequence. Thermal treatment would be performed starting in areas of highest contaminant concentrations and moving out to zones with lower concentrations. The duration of thermal treatment for Alternative 4b would be approximately 36 months. It is anticipated that up to 3,000 heater wells and hundreds of SVE wells, MPE wells, and steam injection wells would be required to implement thermal treatment over the large area that comprises the 2,500 µg/L VOC plume for Alternative 4b.

Unlike Alternative 3 (hydraulic control), thermal treatment has the potential to remove much of the VOC contaminant mass in the treated area in a relatively short period of time, though the types of heating technologies currently available have not been attempted in an area even as large as Alternative 4a. Additional rock core testing would be required after implementation to gauge the effectiveness of thermal treatment in removing mass from the rock matrix.

As with Alternative 3 (hydraulic containment), Alternative 4 was evaluated to assess if, by treating the "contaminant source area," the action would "provide long-term improvement to the groundwater in a reasonable time frame." For the purpose of this evaluation, the action was presumed to be 100 percent successful, with an equivalent result to hydraulic containment: Nevertheless, the modeling indicates that removing either the smaller or larger "contaminant source area" at the site would not change down-gradient groundwater conditions to any significant degree.

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall Protectiveness of Human Health and the Environment evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that are legally applicable, or relevant and appropriate to the site, or whether a waiver is justified.
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.
Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

There are several noteworthy limitations to this alternative. The target treatment depth for both Alternatives 4a and 4b is to 65 feet bgs, constrained by the highly transmissive fracture zone that starts at about that depth. This fracture zone is a major contaminant mass transport network and the amount of contaminant mass entrained in the rock and fractures below this zone drops off significantly. Be that as it may, higher VOC concentrations found below this fracture zone cannot be successfully treated by thermal treatment. In addition, the 2,500 µg/L VOC plume extends beyond the northeast CDE facility boundary, and it would not be technically feasible to install the infrastructure needed for thermal treatment at the Bound Brook or in the railroad right-of-way.

EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below. A detailed analysis of alternatives can be found in the FS.

1. Overall Protection of Human Health and the Environment

Alternative 1, the no action alternative, is not protective of human health and the environment because it does not eliminate, reduce, or control risks posed by the site through treatment, engineering controls, or institutional controls. Alternative 2, long-term groundwater monitoring and institutional controls, would be protective of human health and the environment through the elimination of exposure pathways and the implementation of institutional controls. Alternatives 3a/3b and 4a/4b also include institutional controls to mitigate potential risks resulting from exposure to groundwater; thus, Alternatives 2 through 4 would be protective of human health and the environment.

"Overall protection of human health and the environment" also assesses the degree to which the remedial alternatives achieve the applicable Remedial Action Objectives (RAOs). None of the alternatives, including Alternative 3 or Alternative 4 appear likely to satisfy the "source control" RAOs. While some reduction in mass or migration potential is achieved by Alternatives 3 and 4, EPA's modeling indicates that treating the targeted source zones would not improve conditions in down-gradient segments of the aquifer. Given that, in the case of Alternative 4b, this source

zone is the largest that might be addressed by a site remedy, further source remediation (beyond that already achieved by the OU2 remedy) offers little potential to improve site conditions.
Because Alternative 1 (No Action) is not protective of human health and the environment, it was eliminated from consideration under the remaining evaluation criteria.

2. **Compliance with ARARs**

State and Federal drinking water standards are considered ARARs for groundwater at this site. Experience at similar sites with matrix diffusion of VOCs or PCB contaminants in bedrock indicates that addressing the site with currently available technologies cannot achieve the ARARs for groundwater within a reasonable time period. Because groundwater restoration is technically impracticable, EPA is recommending an ARAR waiver for the groundwater.

The "3" and "4" Alternatives are limited in scope, attempting to address the area of the bedrock where the highest contaminant mass is found. They are not meant to achieve ARARs even in these limited treatment zones. Alternative 3a or 3b would not significantly change contaminant concentrations in the bedrock, because groundwater extraction only affects water in the fractures and draws almost no contaminant mass from the rock matrix. Hydraulic containment is expected to reduce the off-site migration of VOCs, but only from the treated zone. Hydraulic containment would have very little influence on the extensive contaminant mass beyond the fractures directly affected by pumping. In addition, the limited effectiveness of hydraulic containment would end as soon as the system was turned off, requiring that the extraction/treatment remedy operate indefinitely.

Under Alternative 4, contaminant concentrations in the treated area of the bedrock would be expected to decrease over a relatively short period of time as a result of the treatment. The high intensity application of heat would be expected to remove much of the sorbed and dissolved phase VOCs, but only within the treated zone and not within the aquifer as a whole. The target aquifer temperature would not remove PCBs within the aquifer, and the dewatering needed to achieve higher temperatures is not technically feasible. Thermal treatment also has several technical limitations with regard to the depth and surficial area that can be treated, so even the relatively limited treatment areas evaluated in this Proposed Plan would be beyond the scope of this technology. Given these factors, and the potential for partial recontamination after the completion of Alternative 4a or 4b (through back diffusion from neighboring untreated zones), it is highly unlikely that ARARs would be achieved under Alternative 4 for the whole treatment zone.

No location-specific ARARs were applicable to the four groundwater alternatives. No other major ARAR considerations affect remedial decision-making. Alternatives 2 through 4 would be completed in compliance with, action- and location-specific ARARs, such as requirements of the Clean Air Act that would apply to air emissions associated with the treatment of groundwater, and requirements of the Resource Conservation and Recovery Act that would apply to management and disposal of treatment residuals.

3. **Long-term Effectiveness and Permanence**

Groundwater modeling indicates that treatment of either of the "contaminant source areas" – areas with the highest contaminant concentrations in bedrock groundwater - would have will have little, if any, impact on the persistence of the down-gradient plume. While some minor reduction in contaminant mass within the plume would be achieved through treatment (particularly through Alternative 4a or 4b), concentrations would still remain elevated for very long time periods (i.e., on the order of several hundred years). Thus, although Alternatives 3a, 3b, 4a, and 4b may locally improve groundwater quality, the long-term effectiveness of all the alternatives over the entire OU3 area, including Alternative 2 (monitoring, institutional controls), would be the same.

The long-term effectiveness of natural attenuation processes was also evaluated through groundwater modeling. The model indicates that VOCs will persist at concentrations exceeding ARARs for very long time periods, because the rates at which these natural processes (diffusion, dispersion and biological degradation) work is very slow. The slow rate of natural attenuation is substantially the result of matrix diffusion, but the lack of plume migration is also due to the effects of matrix diffusion.

4. **Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment**

Alternative 2 would not satisfy CERCLA's preference for remedies that include on-site treatment as a principal element, though for this site, the OU2 remedy had treatment of source material in the soils as a principal element. Alternatives 4a and 4b (Thermal

Treatment) would partially meet the preference in CERCLA for treatment on site and would result in a reduction in the volume of VOCs in the treatment areas, and a partial reduction in mobility of VOCs to down-gradient portions of the plume. Alternatives 3a and 3b (Hydraulic Control) would result in a reduction of mobility of contaminants to down-gradient portions of the plume as long as the system was in operation. Overall, however, performing additional "source control" actions in the groundwater shows little or no potential for measureable improvement to the aquifer as a whole, relative to the soil source control action already completed under the OU2 remedy.

5. **Short-term Effectiveness**

Alternatives 3a and 3b (Hydraulic Control) and 4a and 4b (Thermal Treatment) would involve construction and/or in-situ treatment hazards that could pose a greater risk to site workers or the surrounding environment than Alternative 2. However, it is anticipated that these risks could be mitigated through the use of engineering controls, safe work practices, and personal protective equipment. All of the alternatives except Alternative 1 (No Action) involve the drilling and sampling of monitoring wells, which is expected to pose minimal risks to site workers and the surrounding environment.

Construction of Alternative 4 would result in the most significant short-term effects in the community, with the installation of wells, piping, treatment works and possibly capping throughout the treatment areas. This alternative would require sufficient surface infrastructure that it could only be implemented in relatively open areas like the 26-acre site. Alternative 4 would have a major short-term impact on the Borough's redevelopment plans for the former CDE facility, as these plans would probably need to be delayed until the completion of the remedial action.

6. **Implementability**

Alternative 2 (Monitoring with ICs) could be readily implemented using commonly available technologies and with minimal design or permitting. Alternatives 3a and 3b (Hydraulic Control) could also be readily implemented. Alternatives 4a and 4b would likely be the most difficult to implement due to the energy, permitting, and heating controls/infrastructure required. Alternative 4b would be especially difficult to implement because it is uncommon to perform thermal treatment over such a large area; it would require installation of up to 3,000 heater wells and hundreds of SVE wells, MPE wells, and steam injection wells. The installation of this many borings and then subsequent abandonment of all of the wells poses implementation complexities. It is also uncertain to what extent thermal heating would effectively remove contaminant mass from the rock matrix.

As discussed in the description of Alternative 4, the 2,500 µg/L treatment area has been slightly modified because the remedial alternative is not physically implementable over the entire area (e.g., it is not technically implementable to perform thermal treatment in a residential area or in an area adjacent to a stream, and it is depth-limited by the highly transmissive fracture zone).

7. **Cost**

The estimated present worth cost of Alternative 2 is $5,721,000. This cost includes costs associated with the installation of several additional monitoring wells, the sampling and analysis for contamination in the groundwater, and operation and maintenance (O&M) costs over a 30-year period. Although Alternative 2 anticipates installation of only four additional wells followed by regular monitoring of the new wells and existing wells, the monitoring program to support the alternative is extensive. The estimated present worth cost of Alternative 3a is $17,440,000. This cost includes the costs mentioned in Alternative 2 with the addition of the installation and O&M of the hydraulic containment system. Alternative 3b has a similar scope over an increased treatment area from 3a to 3b, though the larger treatment area results in a relatively small difference in present worth cost, $21,019,000. This is because of economies of scale associated with building the larger treatment plant.

The estimated present worth cost of Alternative 4a is $33,061,000. This cost also includes the costs associated with Alternative 2 plus the construction of the heating infrastructure, treatment works, associated piping, and heating and collection wells, along with O&M costs for the monitoring program over a 30-year period.

The estimated present worth cost of Alternative 4b is $128,521,000, reflecting a similar scope to Alternative 4a, over an area roughly five times larger. It is expected that a similar scale of equipment would be constructed as anticipated for Alternative 4a, and that the treatment would take place in phases across the site.

For costing purposes, each alternative has an estimated duration of 30 years although, as discussed above, it is anticipated that contaminant concentrations will exceed

ARARs for much longer time periods. The FS performed a cost sensitivity analysis particularly focusing on this issue of the "real" cost of a remedy over the long term, as well as the discount factor used for present value calculations. Not surprisingly, the primary change was to Alternative 3a/3b, which would require long-term O&M, and eventual replacement of worn out equipment, for a hydraulic containment system that would need to continue operating indefinitely.

8. **State/Support Agency Acceptance**

The State of New Jersey is still evaluating EPA's preferred remedy as presented in this Proposed Plan.

9. **Community Acceptance**

Community acceptance of the preferred alternatives will be evaluated after the public comment period ends and will be described in the Record of Decision, the document that formalizes the selection of the remedy for the site.

PREFERRED ALTERNATIVE

The preferred alternative for groundwater is Alternative 2, Long-Term Groundwater Monitoring and Institutional Controls, hereafter referred to as the Preferred Alternative. The preference for Alternative 2 is based upon three factors: (1) the limited options available to successfully treat VOC and PCB contamination in fractured bedrock with extensive evidence of matrix diffusion into the rock over a wide area; (2) the expected limited ability of the groundwater contamination to move beyond its current extent; and, (3) the limited potential for treatment or containment of even the "contaminant source area" to result in a measureable improvement in groundwater quality anywhere in the aquifer within a reasonable time period.

In addition, EPA is proposing an ARAR waiver for the federal and state drinking water and groundwater standards (MCLs and NJ GQC) at this site due to technical impracticability.

EPA expects this to be the final groundwater remedy for the site; however, two considerations may warrant a reconsideration of a remedy for groundwater in the future:

(1) Groundwater currently discharges to Bound Brook, and the OU4 RI/FS is assessing the extent to which potential contaminant releases via groundwater pose unacceptable risks to human health or the environment. Depending upon the results of these investigations, additional groundwater actions may be contemplated as part of an OU4 remedy.

(2) Data from the RI/FS suggests that the contaminant plume is not expected to expand beyond its current limits. Should monitoring indicate that the plume is actually expanding, EPA would have limited options at its disposal, in the form of some kind of hydraulic containment. Should such a response action be needed, EPA, in collaboration with MWC, would evaluate restarting the currently inactive Spring Lake Wellfield, rather than building a new hydraulic containment system. EPA is not proposing use of the Spring Lake Wellfield as a contingency to the Preferred Alternative. EPA would return to the community with additional findings before undertaking such an action.

The Preferred Alternative is believed to provide the best balance of trade-offs among the alternatives with respect to the evaluation criteria. Based on the information available at this time, EPA believes the Preferred Alternative will be protective of human health and the environment, and will comply with ARARs to the extent practicable. The Preferred Alternative would not meet the statutory preference for the use of remedies that involve treatment as a principal element.

COMMUNITY PARTICIPATION

EPA encourages the public to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted there.

The dates for the public comment period, the date, location and time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan. Written comments on the Proposed Plan should be addressed to the Remedial Project Manager Diego Garcia at the address below.

EPA Region 2 has designated a public liaison as a point-of-contact for the community concerns and questions about the federal Superfund program in New York, New Jersey, Puerto Rico, and the U.S. Virgin Islands. To support this effort, the Agency has established a 24-hour, toll-free number that the public can call to request information, express their concerns, or register complaints about Superfund.

For further information on the Cornell –Dubilier Electronics Superfund site, please contact:

Diego Garcia
Remedial Project Manager
(212) 637-4947
garcia.diego@epa.gov

Patricia Seppi
Community Relations Coordinator
(212) 637-3639
seppi.patricia@epa.gov

Written comments on this Proposed Plan should be addressed to Mr. Garcia.

U.S. EPA Region 2
290 Broadway 19th Floor
New York, New York 10007-1866

The public liaison for EPA Region 2 is:
George H. Zachos Regional Public Liaison
Toll-free (888) 283-7626, or (732) 321-6621

U.S. EPA Region 2
2890 Woodbridge Avenue, MS-211
Edison, New Jersey 08837-3679

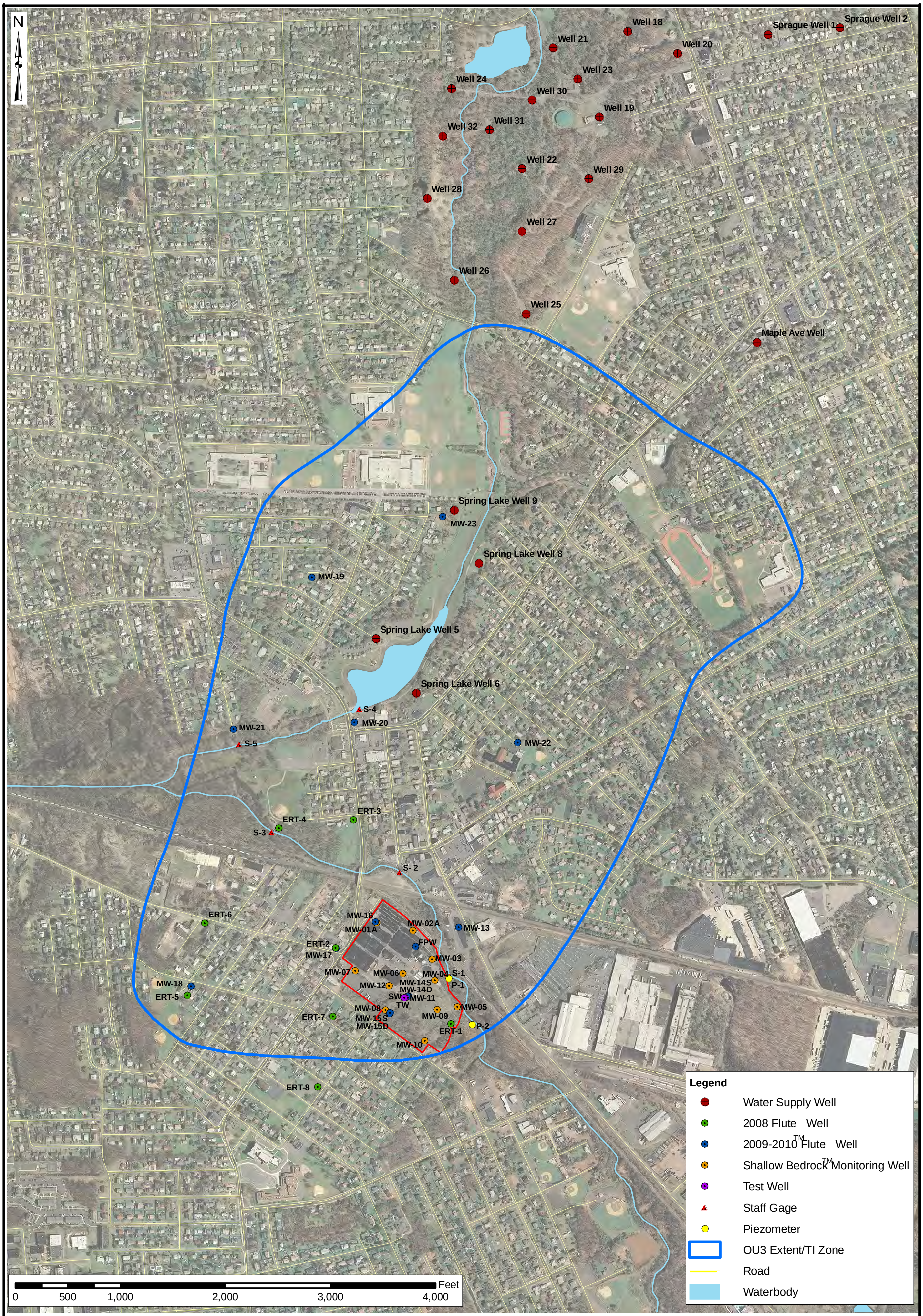
Legend

- Property Boundary
- Bound Brook

0 250 500 1,000
Feet

Source: New Jersey Geographic Information Network
(NJ 2007 Orthoimagery)

ARCADIS MALCOLM PIRNIE	Cornell-Dubilier Electronics Superfund Site South Plainfield, New Jersey	FORMER CDE FACILITY OPERABLE UNIT 2	FIGURE 1



ARCADIS MALCOLM PIRNIE

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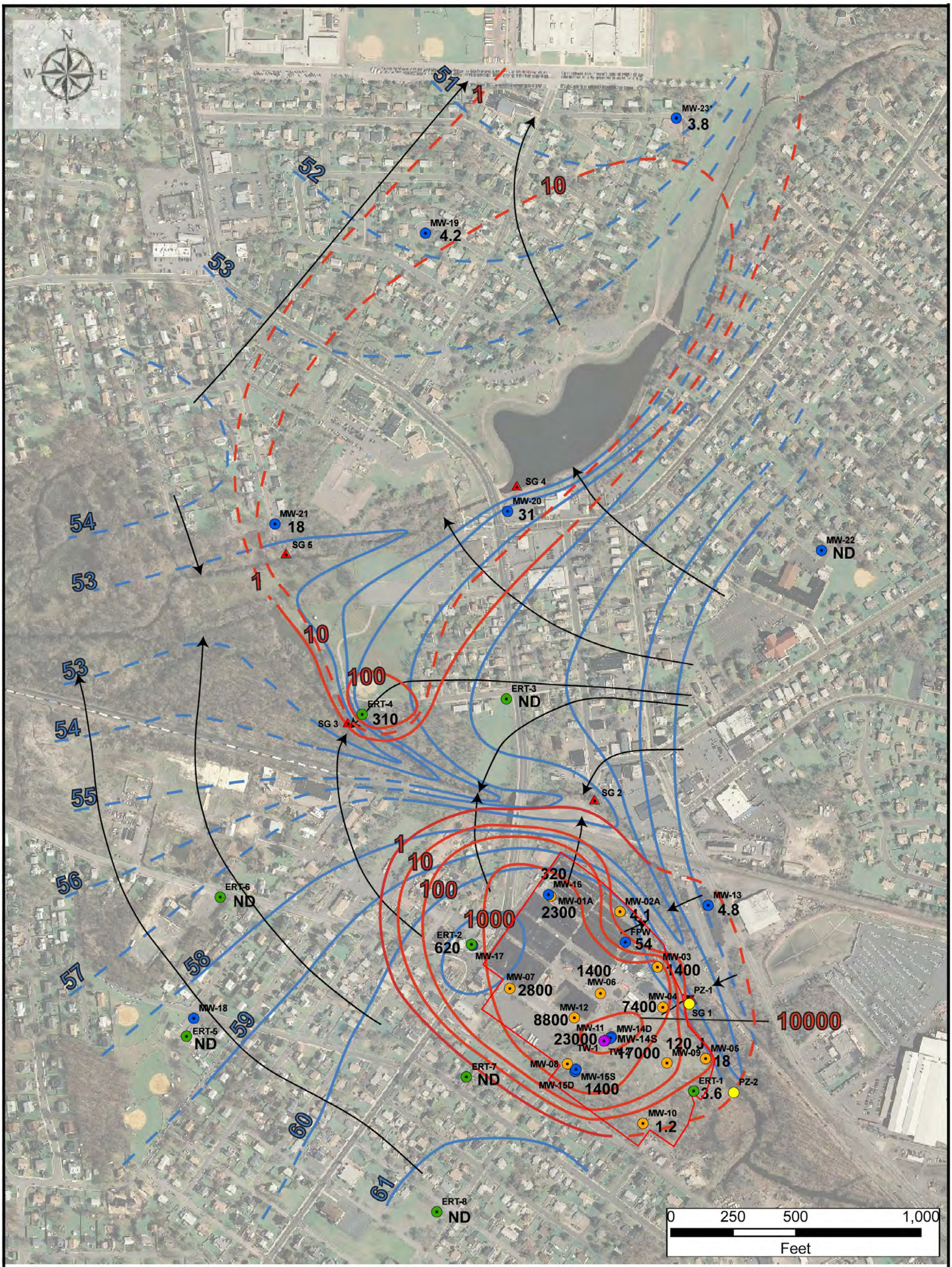
Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

APPROXIMATE AERIAL EXTENT OF OU3 INVESTIGATION

Figure 2

R2-0022689



Legend

- Former CDE Facility
- Shallow Bedrock Monitoring Well
- 2008 Flute™ Well
- 2009 Flute™ Well
- Test Well
- Staff Gage
- Piezometer
- Direction of Groundwater Movement
- MCL — 1 — Line of Equal TCE Concentration (ug/L) (dashed where inferred)
- 3.6 Aqueous TCE Concentration (ug/L)
- 61 Line of Equal Groundwater Elevation (ft msl) (dashed where inferred)

*Note: MW-23 installed and sampled in December 2010, March 2011

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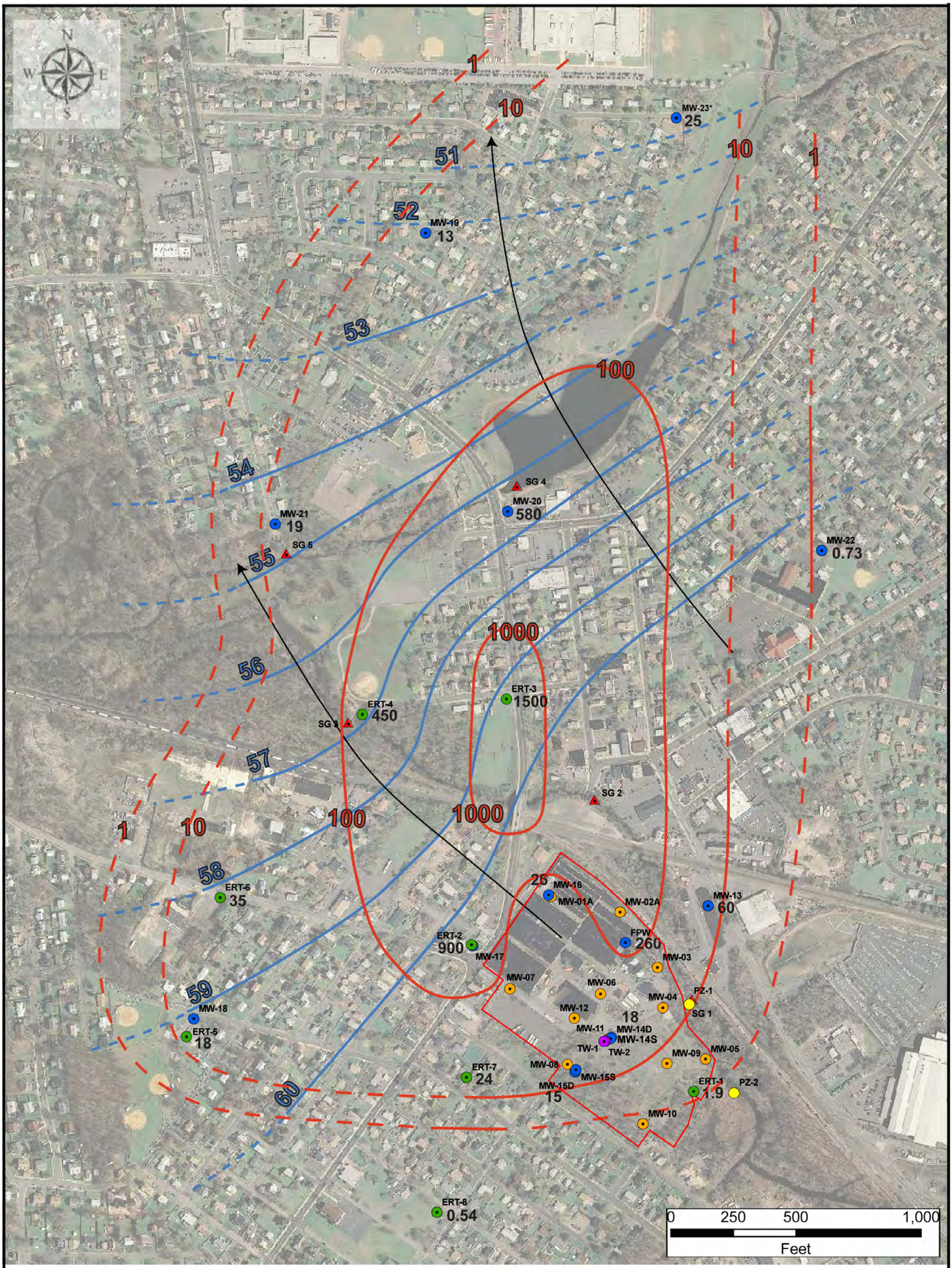
Cornell-Dubilier Electronics Superfund Site - OU3
South Plainfield, New Jersey

Potentiometric Surface of Shallow (0' - 120' bgs) Water Bearing Zone
July 9, 2010
Aqueous Concentration of TCE
March 2010

Figure 3

R2-0022690



Legend

Former CDE Facility	2008 Flute™ Well	Test Well	Piezometer
Shallow Bedrock Monitoring Well	2009 Flute™ Well	Staff Gage	Direction of Groundwater Movement

MCL — 1 — Line of Equal TCE Concentration (ug/L) (dashed where inferred)

3.6 Aqueous TCE Concentration (ug/L)

61 Line of Equal Groundwater Elevation (ft msl) (dashed where inferred)

*Note: MW-23 installed and sampled in December 2010, March 2011

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Cornell-Dubilier Electronics Superfund Site - OU3

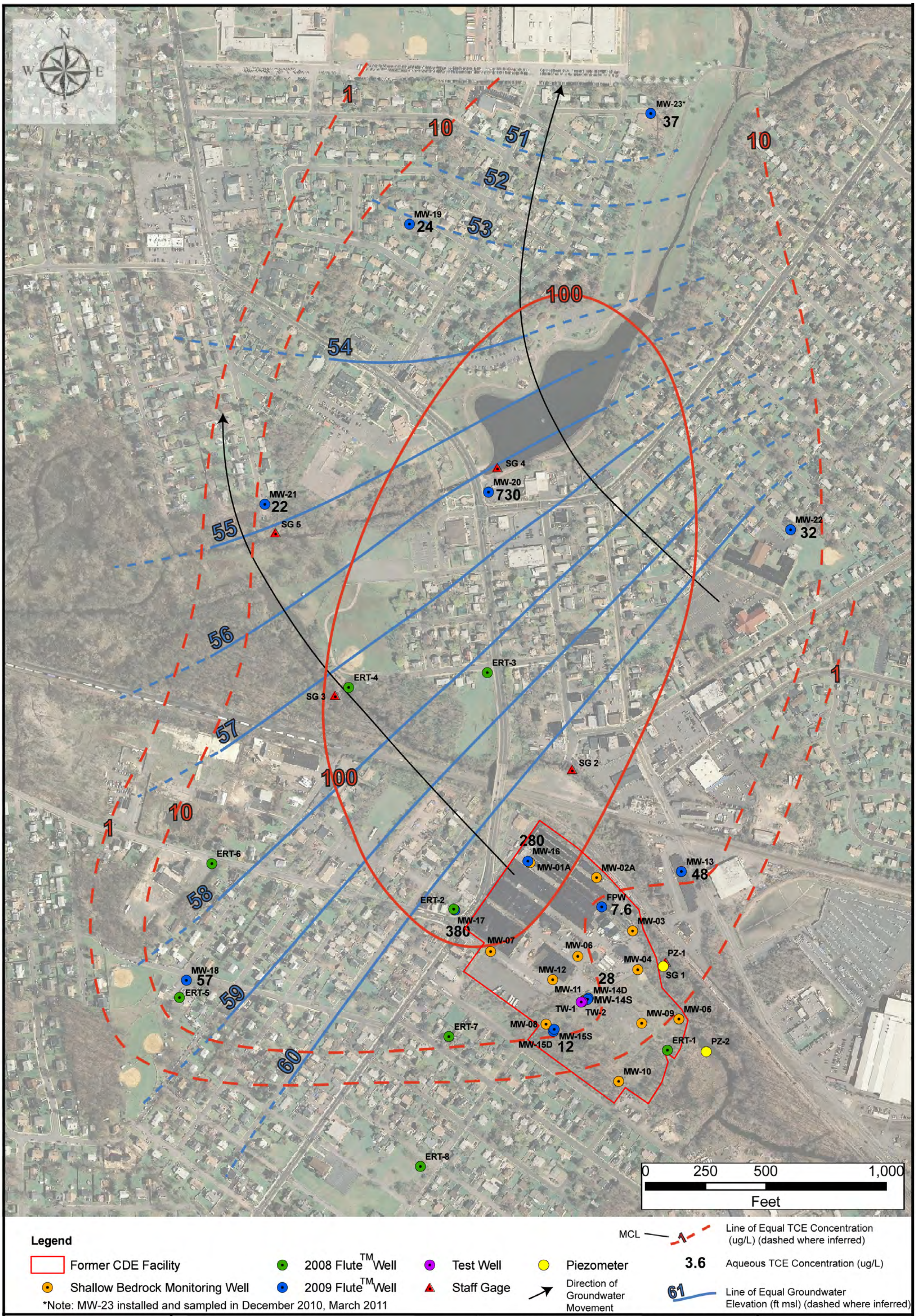
South Plainfield, New Jersey

Potentiometric Surface of Intermediate (120'-160' bgs) Water Bearing Zone July 9, 2010

Aqueous Concentration of TCE March 2010

FIGURE 4

R2-0022691



ARCADIS MALCOLM PIRNIE

Cornell-Dubilier Electronics Superfund Site - OU3

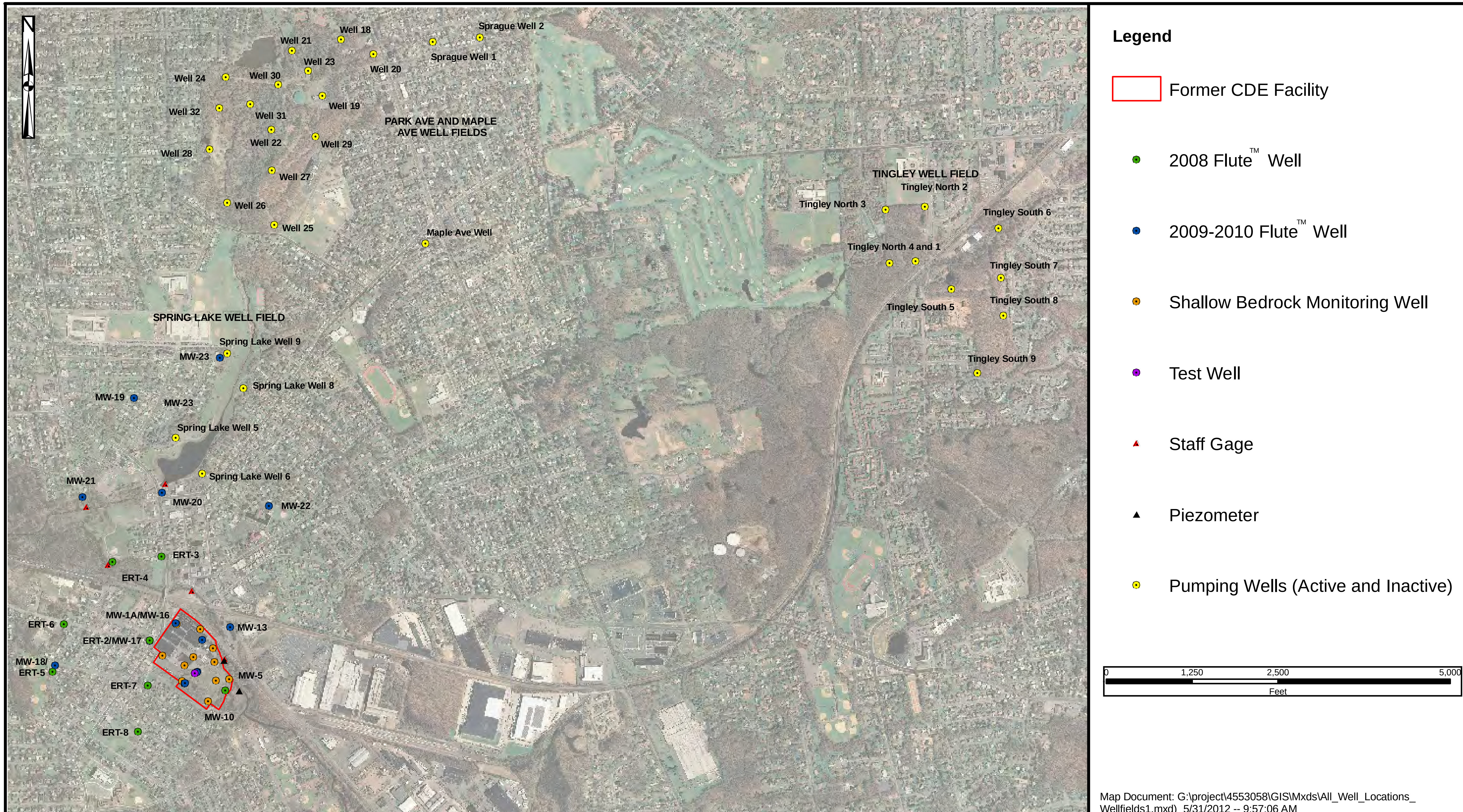
South Plainfield, New Jersey

Potentiometric Surface of Deep (200' - 240' bgs) Water Bearing Zone July 9, 2010

Aqueous Concentration of TCE March 2010

FIGURE 5

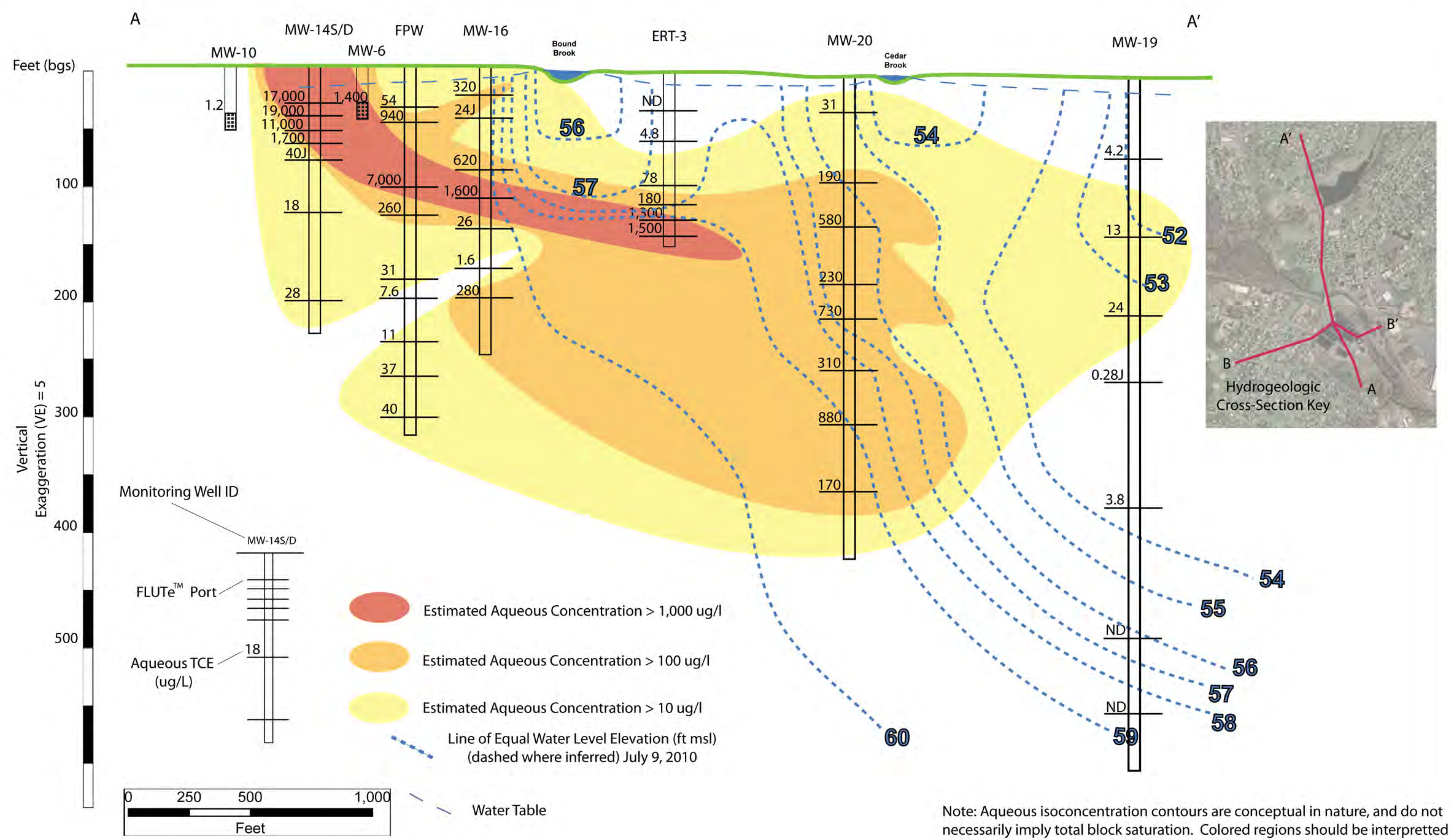
R2-0022692



Map Document: G:\project\4553058\GIS\Mxds\All_Well_Locations_Wellfields1.mxd) 5/31/2012 -- 9:57:06 AM

ARCADIS MALCOLM PIRNIE	Cornell-Dubilier Electronics Superfund Site South Plainfield, New Jersey	Surrounding Wellfield Locations	FIGURE 6

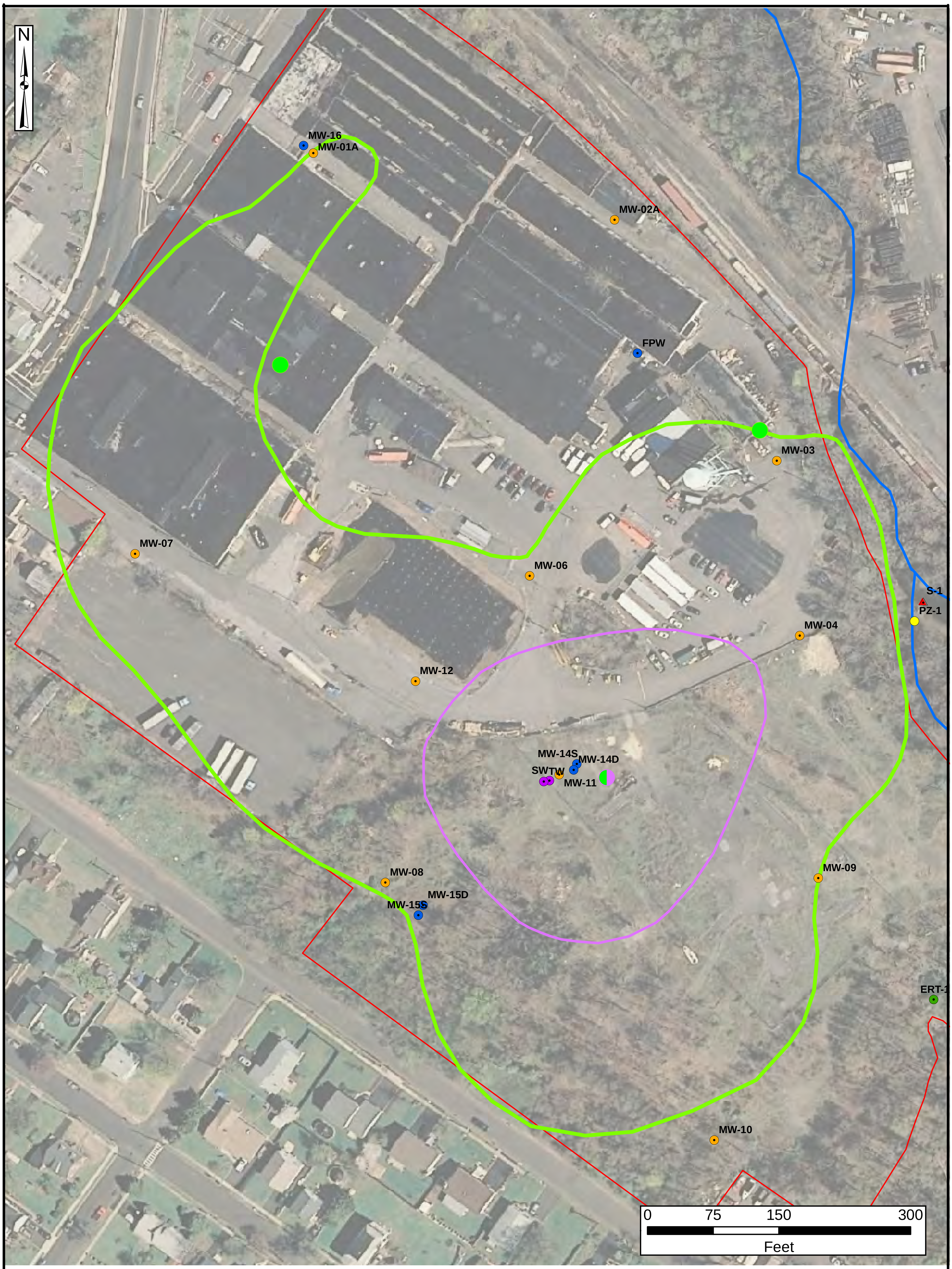
R2-0022693



Note: Aqueous isoconcentration contours are conceptual in nature, and do not necessarily imply total block saturation. Colored regions should be interpretted as zones in which halo saturation is possible at the isocontour interval denoted.

R2-0022694

ARCADIS MALCOLM PIRNIE	CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE - OU3 GROUNDWATER South Plainfield, New Jersey	HYDROGEOLOGIC CROSS SECTION (N-S) July 9, 2010 with AQUEOUS CONCENTRATION ISOCONTOURS - TRICHLOROETHENE (TCE)	FIGURE 7



Legend

*Based on March 2010 Analytical Data

Former CDE Facility	Alternatives 3A/3B Extraction Well	2009-2010 FLUTe™ Well
Alternative 3A - 25,000 ug/L TVOC*	Alternative 3B Extraction Well	Shallow Bedrock Monitoring Well
Alternative 3B - 2,500 ug/L TVOC*	2008 FLUTe™ Well	Test Well

Staff Gage	
Piezometer	
Bound Brook	

ARCADIS MALCOLM PIRNIE

Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

APPROXIMATE TREATMENT AREAS FOR ALTERNATIVES 3 AND 4

Figure 8

Map Document: G:\project\4553058\GIS\Mxds\PlumeContours_TreatArea3A3B.mxd)
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R2-0022695